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ABSTRACT

A study examined the validity of home background at age 13, educational achievement, and work experience as predictors of adult capabilities. The population examined were members of the grade 6 Swedish school population who were born in 1948 on the 5th, 15th, and 25th in each month of that year (n=12,000, or 10 percent of the total). Data about these individuals' family and socioeconomic background, academic achievement, and employment and occupational status were obtained from a national data base on them that had been established in 1961 and periodically updated. In 1980, follow-up data intended to give a broad picture of the participants as young adults were collected by means of questionnaires mailed to three partly overlapping subsamples of the initial 12,000. Home background data were gathered on 2,339 persons (1,126 men and 1,213 women), 500 of whom were contacted for follow-up interviews. These data were supplemented by quantitative indices of the individuals' vocabulary and sequences of uninterrupted speech (obtained during the personal interviews) and self-reported estimated of educational and occupational level, working conditions and their influence, verbal and linguistic skills, civic competence, and practical skills (all of which were reported on the 1980 questionnaire). Sex proved to be a big factor in the respondents' linguistic expression, with men using more words, more different words, and more long words. Educational level was also significant, with persons having a postsecondary education using almost twice as many long words as those with a lower educational level. Findings indicate that home background influences general ability level in grade 6, verbal specificity, and plans, but does not directly influence adult educational level. Ten tables and seven figures display and illustrate the data. (MN)

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Background, education and work as predictors of adult skills

by
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Background

Some ten years ago I observed that very little empirical research had been done in order to assess long-term effects of education with control for input variables such as home background and intellectual level (Härnqvist, 1977). This conclusion was supported by Wolfle (1980) who in a paper on enduring effects of education on verbal skills stated that

> "there is no single longitudinal data source which contains all the information required, and the model decribed below has been estimated from correlations combined from several different sources." (op.cit.p.106)

The present paper tries to fill part of that gap by using a longitudinal data base for studying the relations between background at the age of 13 years, education, work, and some indicators of adult capabilities recorded at the age of 32.

Among the studies cited in the 1977 article was the book by Hyman, Wright and Reed on "The enduring effects of education" (1975). They compared the responses to knowledge questions in public opinion surveys between educational groups. The main critique of their study has been the lack of information on early intellectual performance which must have influenced selection and self-selection to education. Later on Hyman and Wright published a parallel volume on "Education's lasting influence on values" (1979). The problem of selection remains also here.

In a reanalysis of data from the Coleman study of public and private schools Wolfle (1987) came back to the importance of studying long long-term effects and he also referred to Jencks (1985) in support of that view.

Research on long-term effects relates to at least four other research traditions: the study of college effects (e.g. Feldman and Newcomb, 1969) ; status-attainment research in economics and sociology of education (cf. Fägerlind, 1987); life-span developmental psychology (e.g. Schooler and Schaie, 1987); and career development research.

In Sweden several longitudinal studies, besides the present one, have dealt with problems within this area, e.g. the Malmö project (Husén, 1969; Fägerlind, 1975); the Metropolitan project (Janson, 1984); the Örebro project (Magusson, Dunér and Zetterblom, 1975).

Among the earlier publications from the present project several report longitudinal analyses. Härnqvist (1968) and Balke-Aurell (1982) studied changes in ability from 13 to 18 years of age as related to education and early vocational experience. Rubenson (1975) studied the recruitment to adult education among persons with short general education. Härnqvist and Svensson (1980) compared social participation in upper-secondary education in different age cohorts. Reuterberg (1984) used the data in an evaluation of the recruitment effects of the Swedish system for student financial aid.

In the 1977 article a model was sketched with the following main components:
- initial characteristics of the individuals before any differentiation of the school program takes place;
- sorting and learning processes in school;
- sorting and learning processes in occupational and social contexts.

The sorting and learning processes are repeated in a number of cycles, different for different individuals. For each cycle a positive correlation is expected between entry characteristics and achievement. The adult level of knowledge, skill, interests, attitudes etc. is influenced by all these processes.

School may have both a direct impact in the form of adult retention of school-acquired knowledge, skill etc., and an indirect impact through developing skills and habits conducive to further learning out of school, or through serving as an "entrance ticket" to occupational and social contexts where such learning takes place.

The present paper is a rather straightforward presentation of empirical results from the longitudinal project where some of the processes in the model can be controlled. The focus is on the relation between level of education and adult capabilities when entry characteristics are controlled. Although the analyses are done from an individual level perspective the results indirectly reflect the functioning of the whole educational system and its relations to society at large. The macro aspects, however, are not explicitly dealt with in this context.

The longitudinal project

A national data base was established in 1961 of a sample from the Swedish school population born in 1948, more specifically on the 5th, 15th and 25th in each month which adds up to a ten percent sample with an N of about 12 000. The data collection started when the participants were 13 years old and normally in grade 6 of the compulsory school. New information has been gathered at several points of time and for different evaluation and research purposes.

The start of the project was related to the ongoing reform of the Swedish educational system. The comprehensive nine year school was about to be implemented and a need for continual information about the pupils' passage through the system was felt. The 1948 cohort was found both in the traditional system with separation into different schools after grade 6 and the comprehensive system through grade 9 (cf. Härnqvist, 1966). A new data base was established in 1966 with the 1953 birth cohort and this has been used for comparisons over time but not in the present paper. Some major publications with longitudinal analyses of the data have already been referred to, and these give an indication of the manifold uses that have been made of the data bank.

In 1980 follow-up data intended to give a broad picture of the participants as young adults were collected by means of mail questionnaires for three partly overlapping sub-samples of the initial 12 000:

- all persons born on the 15th of each month, i.e. 1/30 of the 1948 birth cohort, i.e. a representative sample of the whole age group;
- all persons in the initial sample who had started a post-secondary education;
- all persons with a measured intelligence at 13 above the 25t percentile whose parents had only compulsory education.This sub-sample was chosen because it was likely to contain individuals ending up at all different educational levels and in such numbers that a post hoc factorial design controlling for socioeconomic origin and intelligence was possible. This sample has been used for loglinear analyses of all responses at item level (Härnqvist, 1984).

For a sub-sample of about 500 individuals the questionnaire information was supplemented with personal interviews in 1981-82.

In this paper the sample of 15th born is used. Table 1 lists the categories of information which will be used in this paper.

Table 1 about here

With one exception - the pupils' plans for future education - all the intial data used are taken from school records or from ability tests administered specially for the longitudinal project. Also the information collected during the period between 1961 and 1980 is of the recorded type although some records were kept specially for the longitudinal project (SCB, 1976).

The follow-up information from 1980 is different. Partly it consists of self-reported facts about education and occupation which to some extent have been checked against recorded information from the period in between. But most of the information consists of self-ratings where there are few possibilities to check the external validity or establish what frames of reference have been used by persons in different objective situations. Ideally the self-ratings of capabilities should have been supplemented with some kind of objective measures. This was not possible in a mail questionnaire. A small attempt is made on one point, however. The vocabulary used in the interviews is compared with self-ratings of verbal and civic skills and also with background, education and work.

In addition to what is presented in this paper the follow-up questionnaire collected information on,

among other things, school satisfaction and the importance of different school subjects, spare-time activities and social network.

Details about the variables will be reported successively in relation to the analytical model applied. The data collection and some preliminary analyses are described in a series of technical reports listed among the references.

Model and methods of analysis

The information about the individuals just summarized has been ordered in a sequence with the following main blocks:

HOME - INITIAL LEVEL - PLANS - EDUCATIONAL LEVEL - WORK - CAPABILITY

The principal metod of analysis will be LISREL (Jöreskog and Sörbom, 1986) which performs path analysis between latent variables based on the observed variables. As a rule the analysis was started with one or several analyses within each block of variables. Then the blocks were put together in successively more complex causal type models.

In the reduction of observed data within some of the blocks two less well-known methods within the LISREL framework are applied:
- a hierarchical analysis of initial level variables separating general level from specific components (cf.Gustafsson, 1988a);
- an estimation of variance components in the self-ratings (cf Gustafsson, 1988b).

The analyses will be done for men and women separately. The reasons for this separation are threefold:
- a need for cross-validation of the measurement models;
- an interest in possible major model differences in the causal models between men and women.
- a wish to keep sex differences in averages out of the correlations on which the analyses are based.

Data

The number of pupils in Swedish schools born on the 15th in any month of 1948 and recorded when the initial data collection was made in 1961 was 4 056. This corresponds to 98.2 % of the estimated number born on the sample days and living at the end of 1960. From this frame the analyzed group was drawn. However, the sample was reduced in several steps. A first but small attrition occurred when the first information was collected in the schools. Then some persons had died before the follow-up in 1980. For some persons no addresses could be found and some did not answer the mail questionnaire in spite of several prompts. The follow-up return could be estimated to 73.7 % of the available sample (Christianson and Härnqvist, 1980).

The group was further reduced before the analysis because of incomplete information. For example those in the original sample that were in other schools and grades than grade 6 of the compulsory school had no comparable information on school achievement and were excluded for that reason. After cleaning the data we ended up with a group of 1126 men and 1213 women for which the information was complete except for a few instances of missing information for occasional items. In the correlations these were dealt with by pairwise deletion. In aggregating information over items means instead of sums were used which prohibits that missing data are counted as real zeros.

The background data of the analysis sample of 2339 persons was compared with available data for the total sample of 4056. The analysis sample scored higher on the intelligence tests and school marks, on average around .10 - .15 of the standard deviation in the total sample. They differed very little in home variables and educational plans. The standard deviations in the intelligence tests were around 95 % of those in the total sample. Thus the analysis sample is somewhat higher in initial level and its variation is somewhat reduced compared to the original sample. This is likely to weaken the relations in the causal model to a minor extent.

Background variables

HOME

The data base included information on father's and mother's educational level (FATHED and MOTHED), each in a four step category scale from compulsory education only to university education. A measure of the socioeconomic status of the home (SES) was constructed on the basis of father's occupation and education. This category scale was ordered in six steps. In the analysis the category numbers were used as numerical scale values.

In the causal analysis the home variables were placed first in the sequence and their latent factor (HOME) thus becomes the only exogenous variable in LISREL. This is one way to handle the home variables. Another is to introduce HOME and INITIAL LEVEL simultaneously in the model as two related exogenous variables. In the present case where ability and achievement variables will be used in combination the chosen sequence is more appropriate.

INITIAL LEVEL

Three types of variables were used to assess the pupils' initial level in grade 6:
- written tests of ability specially constructed for the longitudinal project and administered in the schools by the teachers;
- written tests of achievement, so called standard tests as part of a regular national program of achievement testing in grade 6;
- school marks at the end of grade 6.

The ability tests were three: OPPOSITES (OP), METAL FOLDING (MF) and NUMBER SERIES (NS). They were supposed to measure verbal comprehension, spatial vizualization and inductive reasoning. Each test had 40 items and a split-half reliability of around .90.

Within the same longitudinal project Svensson (1971) has shown that there are strong correlations between the verbal ability test, the verbal achievement tests and the school marks in Swedish; also between the inductive reasoning test and the two measures of mathematics achievement. School marks and next to them achievement test scores are more influenced by the pupils' socioeconomic background than the corresponding ability tests. He used these relations for studying the relative achievement in school for boys and girls and for different home backgrounds.

In the present analysis the measures of initial level have as their main function to form a predictor which as strongly as possible controls for initial differences influencing the adult's educational level. Then the distinction between the three types of predictors is of minor interest. Instead another combination of variables has been tried, namely to use them in a hierarchical model where a factor of general level (GL) is constructed on the basis of all ten variables. In addition it has turned out to be possible to construct from the remaining variance a specific verbal (V*) and a specific spatial vizualization factor (S*). The theoretical and methodological ground has been given by my colleague Jan-Eric Gustafsson who has shown the importance of using g and group factors simultaneously in the factor-analytic study of intelligence (Gustafsson, 1988a).

Here such an approach is used for ability and achievement measures in combination. The resulting model is shown in Figure 1.

Figure 1 about here

According to LISREL conventions observed variables are indicated with squares and latent variables with circles. Since latent variables are conceived of as influencing observed variables the arrows in the figure point in the direction of observed variables.

The verbal tests and marks go together in a verbal factor and the inductive test and mathematics in a quantitative reasoning factor. Metal folding is the only measure of spatial ability. Below the level of first order factors there are some minor correlations between the specific parts of achievement tests and marks in the same subject and between the marks in different subjects. These are indicated

to the left of the observed variables. Above the first order factors a second order factor of general level is found, most heavily loaded in the quantitative first order factor.

Table 2 about here

The statistical estimates of the factor loadings in this hierarchical model are presented in Table 2. These are very high and remarkably similar for men and women. In LISREL terminology Table 2.1 presents the LAMDA's of a measurement model for the first order factors and Table 2.2 is technically a BETA matrix showing the influence of the second order on the first order factors. But LISREL models also have two more parameters: PSI and THETA. THETA indicates the variance in the observed variables not explained by the measurement model and the covariance between their residuals, which contain both specificity and error. The arrows to the left of the observed variables in Figure 1 indicate such covariances. PSI measures the variance and covariance in the latent variables not explained by the BETA matrix.

Some measures of goodness of fit for this and other LISREL models are given in Appendix 1 together with measures of PSI and THETA between variables. The goodness of fit of the whole model is measured with chi-square and preferably this should not be significant for the model chosen. The present model has 28 degrees of freedom and a chi-square of 186 for men and 204 for women - values that indicate very significant deviations from the model. However, with sample sizes of more than a thousand individuals it is almost impossible to get non-significant deviations. Therefore it seems more appropriate to use another measure of fit, namely the adjusted goodness of fit index (AGFI) which here is .939 for men and .936 for women. These figures indicate a rather satisfactory fit, although smaller than in almost all other models. The similarity of the model for men and women serves as an additional confirmation, however.

In order to reduce the computational work in more complex models the scores in the ten variables, transformed to z-scores because of the scale differences (see Appendix 2), have been reduced to three mean z-scores: one for the verbal ability and achievement variables (VERB), one for the single spatial variable (SPAT), and one for the reasoning and mathematical variables (QUANT). In the more complex analyses these three variables form the basis of the general factor (GL) and the specific verbal and spatial factors (V* and S*).

PLANS

The third category of background information collected in grade 6 is the pupils' plans for further education. Three questions dealt with their plans:
- the plans for the next school year when they had their first possibility of choosing a more or less academic study program;
- the number of additional years they expected to spend in education;
- whether they expected to continue to what was then the upper-secondary certificate required for university admission (in Swedish 'studentexamen').

In the preliminary analyses it turned out that the plans for the next school year were so strongly related to home background that they could not be placed in a PLAN factor solely. Therefore only the two other items which deal with a longer perspective have been used under the names of EDYEAR and STUD.

MEASUREMENT MODEL FOR BACKGROUND

In Figure 2 the reduced measures of ability and achievement are put together with home and plan variables in a measurement model for background. This results in three broad latent variables (HOME, GL and PLAN) and two specific factors for verbal and spatial abilities (V*and S*).

Figure 2 about here

The factor loadings (or correlations) in Table 3 are strikingly similar for men and women. The HOME factor is most strongly related to the two variables that are based on the father's status but mother's education contributes as well. This may be an instrumental artifact since father's education

is part of the definition of SES. The GL factor takes up practically all variance in quantitative reasoning and comparatively little of spatial ability. The two specific factors are fairly strong in spite of including also errors of measurement. The PLAN factor has most to do with the plans for 'studentexamen', i.e. the entrance qualification for higher education at that point of time.

Table 3 about here

Educational level

The information on educational level comes from several sources. It was reported by the participants themselves in open-ended form in the follow-up questionnaire. Up til 1968/69 it was also recorded by the National Central Bureau of Statistics in the data base established in 1961. A third source was the Bureau's central register of students in higher education from which information was received until the spring of 1980.

The three sources of information were collated and checked against eachother in a technical report (Christianson and Härnqvist, 1982). A code for education was constructed on the basis of all available information. Here only a vertical classification according to educational level is used, mainly based on the level and amount of academic content. It reflects the still very hierarchical system that met the 1948 cohort. From the 1958 cohort on the system has been less hierarchical and more pluralistic - the implications of which were studied by Härnqvist and Svensson (1980).

Here a seven step scale is used with the following categories from lowest to highest level in respect of academic content:

Category	Men	Women
1 Compulsory school only	154	171
2 Compulsory school and trade school	259	189
3 Comprehensive school with second foreign language	83	117
4 Lower secondary education in selective schools	123	255
5 Upper secondary education 2 years	87	153
6 Upper secondary education 3+ years	204	208
7 Post-secondary education	216	120
Total	1126	1213

In the analyses to be reported the category scale has been used as a numerical variable called EDUC. The average score for men is 4.07 with a standard deviation of 2.18. For women it is 3.79 with SD=1.92.

Background and education

Now it is time to start bringing the variables together in causal models.First the relations between the latent background variables from the age of 13, as shown in Figure 2 and Table 3, and educational level at the age of 32 will be presented in Table 4.

Table 4 about here

Tables 3 and 4 together form a LISREL model. The measurement part of the model (Table 3) is a confirmatory factor analysis where all coefficients are strongly significant and the implicit zeros represent non-significant or very small loadings in conflict with the hypothesized model.

Table 4 shows the structural equation part of the model. The coefficients are standardized regression coefficients (BETAs) in a recursive path model between the latent background variables and educational level. In the analysis this is treated as a latent variable also, however identical with its only indicator, the observed educational level. Coefficients not significant at the .01 level are excluded from the model. This retains coefficients at about .10 and above.

The relations between the latent variables are shown in Figure 3 which illustrates the findings in Table 4 .

Figure 3 about here

HOME influences general level in grade 6, the verbal specificity and plans but not directly adult educational level. GL and V* influence plans and educational level, and PLAN in their turn educational level. The measures of ability and achievement level are so defined that they cannot influence each other. The spatial specificity is unrelated also to the other variables.

These relations hold for both men and women, but there is at least one difference in the size of the coefficients in Table 4, namely the influence of home background on the general ability and achievement level. This seems to be somewhat stronger for boys than for girls.

As stated above the main interest in the background variables lies in the possibility to achieve a strong control for initial variation in relation to the educational level reached as adults. All background variables taken together explain 60 % of the variance in EDUC for men and 53 % for women. Both are quite high but they differ considerably, and in absolute terms also the remaining variance is smaller for women than for men who had a higher mean and more variance to begin with. The influence from home background is mediated through the other factors and particularly through the early educational plans. The ability and achievement variables influence plans more than educational level directly which is no surprise with 19 years between the dates of data collection.

Occupation and work conditions

Here the information comes from the participants themselves as part of their questionnaire responses. Several questions dealt with this area: the present work situation (degree of employment etc), the main occupation, a list of jobs held, unemployment, a rating scale for actual and desired work conditions, and degree of influence on own work situation.

The present analysis will use the information on main occupation, and the ratings of actual work conditions and influence.

The occupation was categorized according to the principles laid down in "Nordisk yrkesklassificering" (NYK) and described in a technical report by Gabriels and Björkdahl (1983). For the present study the very detailed categorization was reduced to eight broad categories with the following content. The classification combines "vertical" and "horizontal" aspects of the occupational structure.

		Men	Women
T	Technology and natural science	201	91
C	Medical and para-medical care	19	200
P	Public administration, law, teaching etc.	164	239
A	Administration and office work in the private sector	92	345
B	Business and commerce	94	65
M	Manual work in agriculture and industry	431	68
S	Service and transport	116	180
R	Remainder	9	25
	Total	1126	1213

The more frequent categories, or in some cases combinations of them, have been coded as dummy variables and correlated one at a time with background and education. In Table 5.1 their regressions on background and education are shown.

Table 5 about here

Most categories studied are related to EDUC, technical and public administration occupations

positively and manual and service occupations negatively. This follows more or less directly from the definition of the categories and the educational qualifications upheld in their recruitment. "Public" occupations including teaching and law have in addition a small positive influence from verbal specificity among men and the large, mainly para-medical category among women a negative relation to general level.

The actual working conditions were described by means of ten items in the questionnaire and the respondent had to check whether each description was applicable, partly applicable or not at all to his or her job. Two examples from the items are given below.

- "Work tasks are clearly specified"
- "Work gives new knowledge"

The degree of influence on the work situation was described in eight items and rated with None, Certain or Great. Two examples:

- "Choice of work tasks"
- "Location of work hours"

An exploratory factor analysis was done for all 18 items together. Four factors covered about 50 % of the variance. They could be characterized in the following way:
- routine-type tasks
- decide how
- decide when
- advancement prospects.

In the final model the items were brought together in two indices:
- self-direction, based on the first three factors (SELFDIRECT);
- advancement, identical with the fourth (ADVANCE).

For each index the items were divided in two parallel scales and average ratings were used in the analysis. The resulting factors had an intercorrelation of .45 for men and .30 for women. When introduced next after EDUC in the causal model for background they had the significant regressions shown in Table 5.2.

Even here the pattern of significant regressions is rather similar for men and women, but the self-rated advancement prospects are much less influenced by background and education for women than for men. Women in general also rate these possibilities much lower than men (cf Appendix 2).

The relations between occupational categories and work conditions are reported in Table 5.3. For men both self-direction and advancement prospects are positively related to administration and office work in the private sector and negatively related to manual occupations. Advancement is rated more positively in the technical and science category. For women "public" occupations like teaching are positively and para-medical occupations negatively related to self-direction. In manual and service occupations the rating of advancement prospects is lower than average.

Self-rated adult capabilities

The self-rated adult capabilities cover three different aspects:
- verbal and linguistic skills,
- civic competence,
- everyday practical skills.

For all three aspects a number of items exemplifying different tasks were included in the questionnaire and the participants had to rate their competence to deal with these tasks. Another common feature of the three aspects is that the variance observed in the responses was divided up in general and more specific components of variance, and these components were introduced as dependent variables in LISREL models of different degrees of complexity. The method used which

is more closely described by Gustafsson (1988b) will be introduced in connection with the verbal and linguistic self-ratings in the next section.

Verbal and linguistic skills

The self-ratings of verbal skills were made in relation to twelve items which were chosen to cover reading, writing, speaking, and listening comprehension. Two items of each category referred to Swedish language, and one item of each dealt with proficiency in English. All items were worded in Swedish. Naturally the items referring to English gave examples on a less advanced level than those dealing with Swedish.

Two examples of Swedish language items:
- "Reading a newspaper editorial"
- "Writing a personal application for a job"

The corresponding items referring to English:
- "Reading an article in English in a topic you are well informed about"
- "Writing a letter in English to a friend"

The systematic design of the questionnaire made it natural to view the answers as expressions of a number of orthogonal variance components.

Six facets could be distinguished in the design:
- reception: reading and listening
- production: writing and speaking
- written: reading and writing
- oral: speaking and listening.
- Swedish
- English

On top of that a general component could be expected with contributions from all items.

A model containing these seven components is presented in Table 6.

Table 6 about here

Every item contributing to a component in the model has the weight of 1. The general component (GENLANG) is built on all 12 items, the receptive component on items dealing with reading and listening, etc.

This model was tested and developed in a series of LISREL analyses. These resulted in some modifications:
- The hypothesized components for reception, oral and Swedish did not show significant values and were omitted from the model.
- Instead the Swedish items for writing and speaking appeared in aseparate component, called PRODSWED.
- In order to diminish the computational work the two items of each Swedish language task were put together and mean scores substituted for single item scores. This reduced the model to eight separate values for each person, each with a weight of one in the relevant components.

In Table 7.1 the estimated variance components are presented. In relation to the Swedish items the components together explained between 55 and 74 % of the observed variance. In the English items between 69 and 84 % of the observed variance was explained.

Table 7 about here

In Table 7.2 the variance components are brought into a causal model with background, educational level and work conditions as explanatory variables. The resulting model is illustrated in Figure 4. Home and general ability do not contribute directly to the explanation but some of the other

regressions are quite striking. Some of them show the same pattern for men and women, others differ.

Figures 4a-c about here

To begin with the common pattern (Figure 4a) verbal specificity at 13 is directly related to the English and written components of the self-ratings at 32. General level at 13 is positively related to self-directive work and this in turn to the general verbal and linguistic confidence. This is also influenced by educational plans at 13 and educational level. Besides that education is related to the confidence in reading and writing skills.

The specific male pattern (Figure 4b) also includes a relation between verbal specificity and general language level. The positive effect of education on reading and writing is stronger than for women. Plans affect the English component strongly and work with advancement prospects is related to writing and speaking confidence in Swedish and to the English component. Behind both there is a strong relation between education and advancement prospects.

For women (Figure 4c) the strongest relation to reading and writing skills goes back to verbal specificity (instead of education). Writing and speaking Swedish is influenced by self-directive work. Advancement prospects on the other hand has no relation to verbal confidence among women.

In spite of its significant variance the productive component does not manage to get any significant regressions from the explanatory variables. In the other components a substantial part of the variance is explained, most so for performance with written materials among men (38 %), to which education and verbal specificity contribute.

In the last part of Table 7 the language components are related to occupational categories. In these analyses only education was controlled but then it takes up the influence from the background variables as well. "Public" occupations are above average in writing and speaking Swedish. Female workers in manual and service occupations are below average. Women in the private sector occupations rate their reading and writing more positively than women in general.

Civic competence

The concept of civic competence is used to designate a person's perceived resources in dealing with public authorities of different kinds in order to get what is due to him or her, whether it is material help or immaterial right. The question asked: "Do you know where to go if you need to ...?" and the answers were "Yes, I know" and "No, I don't" with two different qualifiers: "but I can find out" and "and I don't know how to find out". Each answer was coded i an ordered scale with three steps and the code numbers were used as scores. Through preliminary analyses the items were grouped into two clusters:

- help-seeking items, e.g. "get compensation for unemployment" (HELP),
- assertive items, e.g. "appeal against income taxation" (ASSERT).

For each cluster two roughly parallel indices were constructed. On this basis three variance components were estimated - one general (GENCIV) and one for each cluster. The variance components are shown in the first part of Table 8.

Table 8 about here

As evident from the results the HELP component did not hold as a separate dimension but the other two were strongly significant in spite of their small absolute values. Together they account for between 44 and 64 % of the observed variance of the half-scales.

In Table 8.2 the GENCIV and ASSERT components are related to the latent background variables which have significant regressions among men or women.

The comprehensive model is shown in Figure 5.

Figures 5a -c about here

The common pattern (Figure 5a) includes only three regressions with civic competence. Competence in assertive situations is positively related to home background, and the general component (including help-seeking situations) is negatively related to home. Self-directive work tends to increase the assertive component.

For men (Figure 5b) both aspects of civic competence are related to verbal specificity at age 13, and the general component is influenced by both aspects of work.

For women (Figure 5c) the assertive component varies positively with advancement prospects in the work situation. Educational level has its only regression with general civic competence.

Also occupational categories have been tried as explanatory variables in relation to civic competence. The results are found in Table 8.3. Men in "public" occupations score higher on the general component. Among women the mainly para-medical group is lower than average on assertiveness and the private sector group higher.

Everyday practical skills

When constructing the questionnaire we tried to find practical tasks that traditionally are described as feminine and masculine. Preliminary analyses verified that grouping. Eight practical tasks were presented, each with a four point categorical scale for competence from Very good to Bad. For the analyses they were grouped into three clusters:
- cleaning, cooking, tending and mending clothes (DOMESTIC),
- taking care of car, woodwork and painting, repairing simple mechanical objects (MECHANIC),
- needlework, gardening (OTHER).

Three variance components were hypothesized, one general practical (GENPRACT) based on all three indices, one domestic (DOM) and one mechanic (MECH). The variance components are presented in the first part of Table 9.

Table 9 about here

In the second part of the table (Table 9.2) the three variance components are related to background, education and work conditions.The complete model is shown in Figure 6.

Figures 6a-b about here

For men (Figure 6a) the domestic variance component is positively related to education. The mechanical component varies negatively with education but positively with spatial specificity which here appears for the first time with significant regressions. The general practical level is unrelated to the explanatory variables.

For women (Figure 6b) the pattern is different. The traditionally female tasks are negatively related to spatial specificity. Women who at13 years of age were strong in this factor now as adults rate themselves low in domestic tasks. Their general practical level, on the other hand, is positively related to spatial and negatively to verbal specificity. Home background has a slight positive regression for the latent mechanic component.

In neither case the indices of work conditions have any relations with the ratings of practical competence in the home setting.

Finally in Table 9.3 the relations of the practical components and occupational categories are reported.The mechanical component is positively related to technical and manual occupations for men; negatively related to public service for men and to business administration and office work for men and women. The domestic component is above average for men in public service and women

in business offices.

Vocabulary in personal interviews

As mentioned in the beginning a sub-group of the follow-up sample also took part in personal interviews. These had two purposes:
- to complement and deepen the information about education and occupation,
- to provide a basis for analyses of verbal skills and concept formation as counterpart to the self-rated competence.

The interview had a set of opening questions for each area covered. After these it was conducted in a semi-structured way. The entire interview was taped and recorded word for word for computer processing. In this context only a few results from a preliminary analysis of the vocabulary will be reported.

The sub-sample for personal interviews was taken mainly from the two non-representative parts of the main sample: those having started post-secondary education and those having parents with only compulsory education. This means that the interviewed group is likely to differ on many characteristics from the representative sample used in the earlier parts of this paper.

A comparison between the representative sample (N=2339) and the persons interviewed (N=417 with transcribed interviews) indicates that the interview sample is about .4 - .5 units of standard deviation higher in ability and achievement measures and in educational plans and educational level. The standard deviations among the interviewed are about 95 % of the SD's of the representative sample. Even with these differences it should be possible to use measures from the interviews in the same type of analyses as earlier in the paper.

In a technical report (Härnqvist, Christianson and Tingsell, 1985) a number of quantitative indices of the length and vocabulary of the interview were developed and some comparisons with level of education and gender presented. From these indices four have been picked out for the present study:
- number of words used in the total interview (WORDS),
- number of different words (DIFF WORDS),
- number of different word with more than 10 letters according to normal Swedish spelling (LONG WORDS),
- number of sequences of uninterrupted speech (SEQUENCES).

From a cognitive and linguistic point of view these indices are very superficial, but even so they have some interesting relations to explanatory variables as will be seen in Table 10.

Table 10 about here

The first part of Table 10 shows the means and standard deviations for the indices among men (N=199) and women (N=218). The average number of words spoken by the interviewed in about one hour is more than 4000 but with a variation ranging from less than 2 000 to above 10 000. They are distributed over around 800 different word, 70 of which are long words. The words are divided in almost 100 sequences of uninterrupted speech, also with considerable variation between persons.

The most interesting finding in Table 10.1 is the large differences between men and women in the word counts which amount to .3 -.4 SD-units. The men use more words, more different words and more long word. The men's sequences of uninterrupted speech are longer too.

In Table 10.2 the indices are related to the questionnaire ratings of verbal and civic competence. Among the components of verbal competence only the general (GENLANG) is significantly related ($p<.05$) to the word counts and the regression increases from WORDS over DIFF WORDS to LONG WORDS in a quite regular way ending up at .40. The number of sequences is negatively related to GENLANG among women. Civic competence is analyzed only in relation to LONG WORDS and GENCIV has significant regressions for both men and women. The most striking result, however, is

the rather strong relation between women's rating of their civic competence in assertive situations and their use of long words.

Table 10.3 shows to what extent the number of long words in the interviews can be predicted by background, education and work conditions. Educational level has quite strong coefficients. The regressions for verbal specificity are kept in the table in spite of not being significant but they are very similar for men and women. The main results are illustrated in Figure 7.

Figure 7 about here

The number of long words is almost twice as high among persons with post-secondary education as it is on the lowest educational level. Men differ from women on all levels. The differences are almost as striking between the lowest and the highest third of the group in self-rated general verbal skills.

In conclusion the recorded interviews look as a valuable source for linguistic analyses and the results so far indicate that the self-ratings of verbal competence have some kind of behavioral validity.

Discussion

In the discussion the author has a chance to sit back and reflect over what has been done and what has been neglected in a paper. Such second thoughts are long overdue in the longitudinal part of this study because what was decided almost 30 years ago cannot be changed. To be foreseeing enough is a major problem in a longitudinal project, especially when it has so multifarious purposes as the present one. But the follow-up is closer and in principle it can be repeated and even more so the analysis of data.

To begin with methodology, this study is rather monolithic as it is based almost completely on path analysis with latent variables using the LISREL technique. Path analysis as a method for causal analysis has recently been the victim of a frontal attack by the statistician D.A.Freedman (1987). Apparently he is even more critical when the paths go between latent constructs as in the structural equation models used here. It is outside my competence to discuss the problems of statistical estimation involved. For the present application the question is, at first hand, whether the relations found are something more than descriptions of a situation that prevailed when the cohort studied passed through the educational system. This involves basic theoretical aspects of what causality means as well as the problem of specification errors, i.e. if important variables are omitted from the model or measured without validity. Freedman evaluates path analysis against an *as-if-by-experiment* assumption (op.cit.p.103) which is an impossible requirement on an observational study and is rejected in several of the responses to Freedman in the same issue of the Journal of Educational Statistics. Even with an awareness of the problem in using causal terms the descriptive text becomes almost unreadable without words like effect, affect and influence. This does not imply an acceptance of the *as-if-by-experiment* assumption.

The use of LISREL in this paper can be criticized also from other points of view. All models developed here deviate significantly from the relations between observed variables and yet they are used and interpreted. But as pointed out in the presentation, with samples of the size used here high chi-squares are very difficult to avoid and the other measure of fit, the adjusted goodness of fit index (see Appendix 1), lies in most instances above .95 which is high. Besides the basic measurement models are very similar for men and women while the structural equation models differ in interesting and interpretable ways.

Another critique might well be that factor loadings and regression coefficients are very abstract and distant from the realities on which they are based. That is true and in other reports (Christianson and Härnqvist, 1981; Härnqvist, 1984) the response frequencies on item level have been used for comparisons between men and women, between socioeconomic, ability and education groups. When studied on that level, and with loglinear analysis to partial out the associations, the explanatory variables have shown a similar relation with item responses as is found here with aggregated scales. But in the loglinear case there is no way to order influences in a causal chain as

is possible in path analysis. Were it not for the space and time restrictions on this presentation the regressions could have been supplemented with illustrative examples on a more concrete level. Here it is done only for the vocabulary in the interviews.

Irrespective of statistical technique the question remains whether the constructs chosen are the relevant ones, if they are introduced in the "right" order and if they are measured adequately. These questions are better discussed in relation to the different parts of the model.

To begin with background the constructs used for its description are a very small selection out of an immense universe of possibilities. The frame to choose within now was decided long ago but a further selection was done when designing the present analysis. This selection was guided by the intention to get a strong model for predicting adult educational level, not by an ambition to explain, say different aspects of the pupils' initial level or the manifold processes in the home that influence school achievement. Judging from the prediction attained - between 53 and 60 % of the variance in educational level - the choice of variables was rather successful. General level, verbal and spatial specificity give a parsimonious picture of initial level. The variable based on educational plans is highly predictive. The home variable might, however, have been more efficient if it had included more direct measures of the cultural resources of the home. Now it is mainly an index of socioeconomic status. Since different social classes on the same status level have different attitudes to education a more class-oriented categorization of occupations might have been helpful. Such a categorization is now being developed by my coworker Ulf Christianson.

With achievement in grade 6 as such a strong component in initial level it seems rather unproblematic to place it after home background in the model and not as a second exogenous variable. Likewise the plans for further education should come after both these variables in spite of being measured at the same time as ability and achievement. Some difficulties with the observed data, however have already been mentioned. The plans or rather decisions for the next school year were so strongly related to the home variables that they had to be excluded from the model in order not to damage its fit. With another theoretical approach to the study of educational careers, for instance that of the French sociologist Pierre Bourdieu, this finding might have been integrated in a more global concept of cultural vs. economic capital in the home (cf. Bourdieu, 1979).

The education received by the adults, which is the main explanatory variable in the study, has been summarized in just one variable - a measure of level achieved in a hierarchical classification of education mainly according to academic content. This "vertical" scale only utilizes a small portion of the available information which also covers both general and vocational education, both youth and adult education, and "horizontal" subject matter variations in upper-secondary and post-secondary education.

This admittedly theoretical bias of the indicator of educational level has to do with the emphasis on generalized skills vs. specific retention in the original conception of the study of long term effects of education (Härnqvist, 1977).

> "Now I would like to return to my model and see what happens if one tries to compare groups of adults who left formal education with different amounts and types of schooling. As regards curriculum content, they have, almost by definition, learned either more or less of the same thing, or they have learned different things. Therefore it is not very meaningful to compare their retention of curriculum-specific knowledge. Other types of variables measuring more generalized outcomes have to be found. General intelligence and special aptitudes, critical thinking ability and basic communication skills meet this requirement. And so does acquisition of new knowledge - the major target variable in Hyman's study - and a number of characteristics of cognitiv styles, information processing and problem solving." (op.cit.p.10)

Occupation and work were part of the 1977 model but mainly as controls for what happens to generalized skills after completing education. When planning this paper the intention was to give these aspects a more central status in the analysis. As evident from the previous exposition this change in emphasis has not been achieved. There simply was not enough preparatory work done in

the project for utilizing the information collected for a more deep-going analysis. However, the occupational categories compared, even with their heterogeneous composition, differ in their relations to both antecedents and "postcedents". The respondents' descriptions of the characteristics of their work form the basis of two interesting latent variables - self-direction and advancement prospects. Although the measurement techniques differ the term self-direction was chosen because of the variable's affinity to the concept of occupational self-direction in Miller, Slomczynski and Kohn (1987, pp185-188). These authors have demonstrated its important role in affecting intellectual process among adults.

Work is placed after education in the path model and this is certainly correct for a majority of the participants. But there are many exceptions - persons who chose to continue their education because of work experience. With an increased participation in life-long education a more dialectic relation between education and work will develop, and this is worth a special study also in this data base.

When coming to the real dependent variables of our model - generalized outcomes of education and work - it is evident that only a part of the ambitious program quoted above was possible to realize in the format of a mail questionnaire study. Self-rated capabilities had to be substituted for measured capabilities and instead a broader spectrum of the adults' situation, including spare time activities and social network, was recorded.

Confidence in own capabilities is a legitimate outcome in its own right, but when it is used as a surrogate for measured capability two main problems arise. The first is its obvious subjectivity. The second and more serious in this context is to which implicit norm a person's ratings are related. Even though the ratings are made in absolute terms they are influenced by imagined reference groups and these are likely to differ between persons in different educational and occupational strata. The ratings can be referenced to an image of people in general or to the surrounding social context. And these reference groups are likely to differ both in level and variation. The problem is known from the measurement of attitudes but here the pretension on external validity is greater. A tentative hypothesis is that the implicit norm or reference group affects the general level of self-ratings more than it affects the variation within individuals between different aspects of a capability. Therefore the separation of a general variance component - which also may include response set - from more specific components is an important methodological device in the analysis of self-ratings. Most efficiently it was applied to the self-rated verbal and linguistic skills where it could be based on a systematic design also in the questionnaire - a happy coincidence, in fact, more than an act of foresight.

Confidence in one's capabilities is likely to grow out of experienced proficiency in different educational, occupational and social contexts. Now let us take another look at the figures that illustrate variables which influence self-rated verbal skills. In Figure 4a those who were more successful in verbal contexts (V*) rate their reading and writing skills (WRITTEN) and English proficiency as adults higher irrespective of what education and work they have had in the 19 years in between. Education influences the general language component directly and indirectly too via self-directive work.

In the two figures that separate out regressions which are unique for men or women or particularly strong for either sex (Figures 4b and 4c) seven out of eight arrows go to the specific components. They form an interesting pattern. Men's reading and writing skills (WRITTEN) are strongly influenced (.53) by their educational level and women's by their verbal specificity as six-graders (.35). Men's confidence in writing and speaking Swedish - maybe a more aggressive language behavior than reading and writing - is related to work with advancement prospects (.44) which in turn is influenced by their educational level (.38). Women's confidence in writing and speaking Swedish is related (.42) to self-directive work (teaching?) and connected to educational level (.26) via that type of work characteristics.

These profiles may speak for the relevance of the specific components vs. the general one. On the other hand the general language component is the only one among them which is related to the external criteria of verbal behavior - the word counts from the personal interview done almost two years after the self-ratings. Moreover the regressions show a steady increase when the counting

goes from all words, via different words, to long words. Superficial as these criteria may be, they still have most interesting relations not only to self-rated language skill but also to self-rated civic competence in assertive situations and educational level.

In the case of civic competence (Figures 5a-c) it is more difficult to evaluate the relative influence on general and specific components as it was not possible to differentiate the help-seeking from the general component. Educational level has little to do directly with either the general or the assertive components. Instead these are related to home background, verbal specificity and the two variables that characterize work.

Self-rated skills in everyday practical situations (Figures 6a-b) show still another pattern of regressions. The picture is different for men and women in a sort of reciprocal way. In men education seems to develop less sex-stereotype conceptions of their competencies. Women's self-ratings are more related to the background variables. Those coming from homes higher on the SES scale are less sex-stereotype in their ratings. High spatial specificity at the age of 13 results in lower domestic ratings as adults and higher ratings in the more balanced component, the general practical level.

The overall picture of these three competence areas is that educational level has most to do with verbal and language skills, little to do with civic competence and some influence on sex-role attitudes among men. The work characteristics influence civic competence most and practical competence not at all. Spatial specificity comes in with a direct influence where it is most likely to do so, namely in a differentiated way in relation to the practical skills, and verbal specificity influences the self-ratings of verbal skills.

These results give a differentiated picture of the relations between the explanatory variables and the self-rated competencies. The variations between the areas contribute to an impression that the ratings have at least construct validity and to some extent they might even have validity against external criteria. So far, however, the word counts in the interviews are the only external criterion to prove that the self-ratings contain more than subjectively perceived competence. A further analysis of the interviews is likely also to give some indications of the persons' cognitive level and information processing capacity which can be used as outcome variables.

In this analysis educational level has had a less pervasive influence than might have been expected from the earlier analyses at item level (Härnqvist, 1984). To some extent this depends on differences between path analysis and simultaneous analysis of partial effects. In the path analysis early variables have taken over some of the influence that was ascribed to education. Another reason is that some variables describing the participants' situation in general have been omitted here. For instance, several spare time activities in the cultural field are positively related to education. Also the earlier studies of relative changes in intelligence (Härnqvist, 1968; Balke-Aurell, 1982) resulted in support of education as a major influence.

Another question that has been touched above is to what extent the results - confirmative or not - of a longitudinal study within one age cohort are typical for just a specific period and situation. This cohort passed through a still rather hierarchical educational system that was about to become changed at all levels. Their careers contribute a baseline for evaluating the impact of the later reforms - and to some extent they already have done so as mentioned in the introduction. They entered higher education around 1968 as members of one of the largest groups of university entrants both before and after, and in a period of student unrest. Those who went directly to work met a high demand for labor and a market in economic expansion. The impact of such macro level factors cannot be evaluated in a study like the present one but one should be aware of their existence.

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Appendix 1 Additional information about the LISREL models

1.1 Measures of goodness of fit

Table		Men Df	Men chi^2	Men AGFI	Women Df	Women chi^2	Women AGFI
2	Hierarchical model	28	186	.939	28	204	.936
3-4	Background-education	20	58	.975	20	69	.973
5.1	Occ-background-educ						
	Occ T/C	23	60	.976	23	70	.974
	Occ P	23	62	.975	23	69	.934
	Occ AB/A	23	61	.975	23	75	.972
	Occ M/MS	23	60	.976	23	82	.969
5.2	Work-background-educ	54	140	.970	54	147	.970
5.3	Work-education-occ	Part of model 9.3 (see below)					
7	Verbal skills						
7.1	Variance components	23	95	.966	23	131	.961
7.2	Verbal,back,educ,work	170	334	.964	172	399	.960
7.3	Verbal,educ,occ,work						
	Occ T/C	66	145	.972	67	230	.959
	Occ P	66	146	.971	67	237	.958
	Occ AB/A	66	143	.972	67	260	.953
	Occ M/MS	66	141	.972	67	221	.960
8	Civic competence						
8.1	Variance components	3	14	.979	3	5	.993
8.2	Civic,back,educ,work	103	263	.961	105	306	.958
8.3	Civic,educ,occ,work						
	Occ T/C	26	107	.962	27	146	.951
	Occ P	26	109	.961	27	150	.950
	Occ AB/A	26	109	.961	27	165	.945
	Occ M/MS	26	105	.962	27	137	.954
9	Practical skills						
9.1	Variance components	2	21	.965	1	8	.974
9.2	Pract,back,educ,work	92	260	.959	90	236	.964
9.3	Pract,educ,occ,work						
	Occ T/C	21	69	.972	22	85	.968
	Occ P	21	67	973	22	78	.971
	Occ AB/A	21	67	.973	22	102	.962
	Occ M/MS	21	63	.974	22	83	.969
10	Vocabulary						
10.2	Words,verbal	31	46	.931	32	64	.918
	Diff words,verbal	31	49	.927	32	66	.916
	Long words,verbal	31	50	.925	32	64	.918
	Interventions,verbal	31	38	.940	32	63	.920
	Long w, verbal,civic	69	117	.894	69	109	.932
10.3	Long w,back,educ,work	66	142	.864	66	94	.916

1.2 Covariances between residuals of observed variables (THETA)

Table		Men	Women
2	English test - English marks	.20	.16
	Swedish marks - English marks	.11	.12
	Swedish marks - Mathematics marks	.08	.10
	English marks - Mathematics marks	.10	.11
	Metal folding -Number series	.11	.11

1.3 Covariances between residuals of latent variables (PSI)

Table		Men	Women
5.2	Selfdirect - Advance	.34	.25

Also in Tables 7.2, 8.2 and 9.2 with some variation in the third decimal place.

Appendix 2 Means and standard deviations in observed variables

	Mean		S.D.	
	Men	Women	Men	Women
FATHED	1.27	1.27	.69	.69
MOTHED	1.20	1.18	.52	.50
SES	2.09	2.10	1.27	1.26
OPPOSITES	23.3	23.1	6.4	6.5
READING TEST	383	374	76	70
WRITING TEST	515	539	104	94
ENGLISH TEST	54.8	58.7	18.0	17.2
SWEDISH MARK	3.42	3.60	.88	.84
ENGLISH MARK	2.96	3.29	.99	.93
METAL FOLDING	22.6	20.9	7.2	6.5
NUMBER SERIES	21.0	19.8	7.7	7.3
MATHEMATICS TEST	427	407	96	88
MATHEMATICS MARK	3.27	3.26	1.06	1.03
VERB (z-mean)	-.08	.08	1.03	.97
SPAT (z)	.13	-.12	1.05	.97
QUANT (z-mean)	.08	-.07	1.03	.97
EDYEAR	3.66	3.79	1.82	1.77
STUD	1.73	1.77	.77	.79
EDUC	4.07	3.93	2.18	1.92
OCC T/C	.18	.16	.38	.37
OCC P	.15	.20	.35	.38
OCC AB/A	.17	.28	.37	.45
OCC M/MS	.38	.20	.49	.40
SELFDIRECT	2.27	2.09	.41	.41
ADVANCE	2.08	1.81	.80	.80
READING SWEDISH	3.27	3.19	.59	.58
WRITING SWEDISH	2.77	2.80	.73	.69
SPEAKING SWEDISH	2.86	2.63	.68	.73
LISTENING SWEDISH	3.10	3.04	.56	.56
READING ENGLISH	2.45	2.48	.95	.93
WRITING ENGLISH	2.11	2.41	.95	.93
SPEAKING ENGLISH	2.44	2.47	.87	.86
LISTENING ENGLISH	2.33	2.37	.90	.87
HELP	2.68	2.74	.37	.34
ASSERT	2.47	2.43	.47	.47
DOM	2.40	3.15	.59	.51
MEK	3.00	1.92	.69	.60
REST	1.89	2.95	.55	.67

Tables and Figures to

Background, education and work as predictors of adult skills

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Table 1 Categories of information used in the analyses

1.1 From the initial data collection in 1961

Sex
Father's and mother's education, socioeconomic status
Verbal, spatial and inductive ability tests
Achievement tests in reading, writing, English and mathematics
School marks in Swedish, English and mathematics
Plans for future education

1.2 From the period between 1961 and 1980

Officially recorded information on education

1.3 From the questionnaire study in 1980

Education (self-reported)
Occupation (self-reported)
Working conditions and influence over own work situation (self-rated)
Verbal and linguistic skills (self-rated)
Civic competence (self-rated)
Practical skills (self-rated)

1.4 From the interview in 1981-82

Quantitative indices of length and vocabulary

Table 2 Hierarchical model for ability and achievement variables at age 13

2.1 First order factors

	VERB		SPAT		QUANT	
	M	W	M	W	M	W
OPPOSITES	.79	.81				
READING T	.93	.91				
WRITING T	.92	.91				
ENGLISH T	.83	.83				
SWEDISH M	.87	.82				
ENGLISH M	.76	.74				
METAL FOLD			1.00	1.00		
NUMBER SER					.71	.70
MATHEM T					.95	.94
MATHEM M					.87	.87

2.2 Second order factors

	GENERAL LEVEL	
	M	W
VERB	.80	.83
SPAT	.47	.47
QUANT	.99	.96

Table 3 Measurement model for background variables at age 13

	HOME		GL		V*		S*		PLAN	
	M	W	M	W	M	W	M	W	M	W
FATHED	88	88								
MOTHED	66	65								
SES	82	79								
VERB			73	75	64	63				
SPAT			48	47			88	88		
QUANT			97	96						
YEARED									68	67
STUD									81	80

Table 4 Causal model for background variables and education

	HOME		GL		V*		S*		PLAN	
	M	W	M	W	M	W	M	W	M	W
GL	.30	21								
V*	.19	.21								
S*										
PLAN	.39	43	48	.44	23	.24				
EDUC			.28	.30	.15	.11			.52	.48

Table 5 Occupation and work conditions

5.1 Occupation, background and education

Men	HOME	GL	V*	S*	PLAN	EDUC
T						.26
P			11			30
AB						
M					-.25	-.40
Women						
C		-.15				
P						.46
A						-.17
MS						-.31

5.2 Work conditions related to background and education

	Men			Women		
	GL	EDUC	%EXP	GL	EDUC	%EXP
SELFDIRECT	.14	.21	10	14	.26	13
ADVANCE		38		.17		3

5.3 Work conditions related to occupation (education controlled)

Men	T	P	AB	M
SELFDIRECT			.19	-.19
ADVANCE	.16		.25	-.43
Women	C	P	A	MS
SELFDIRECT	-.12	.28		
ADVANCE				-.15

Table 6 Variance component model for verbal and linguistic skills

SWEDISH	GLA	REC	PRO	WRI	OR	SW	ENG
Reading 1	1	1		1		1	
Reading 2	1	1		1		1	
Writing 1	1		1	1		1	
Writing 2	1		1	1		1	
Speaking 1	1		1		1	1	
Speaking 2	1		1		1	1	
Listening 1	1	1			1	1	
Listening 2	1	1			1	1	
ENGLISH							
Reading	1	1		1			1
Writing	1		1	1			1
Speaking	1		1		1		1
Listening	1	1			1		1

Table 7 Verbal and linguistic skills

7.1 Variance components

	Men	Women
GENLANG	.219	.218
PRODUCT	025	030
WRITTEN	041	029
ENGLISH	359	376
PRODSWED	.037	.049

7.2 Regression on background, education and work

Men	V*	PLAN	EDUC	SELFD	ADV	%EXP
GENLANG	16	19	19	.22		29
PRODUCT						0
WRITTEN	19		53			38
ENGLISH	.22	.33			.14	25
PRODSWED					44	19
Women						
GENLANG		19	.23	.16		21
PRODUCT						0
WRITTEN	35		17			18
ENGLISH	.29		.22			17
PRODSWED				42		16

7.3 Regression on occupation (education controlled)

Men	T	P	AB	M
PRODSWED		.25		
Women	C	P	A	MS
WRITTEN			.15	
PRODSWED		.19		-.22

Table 8 Civic competence

8.1 Variance components

	Men	Women
GENCIV	.043	.038
HELP	004	.001
ASSERT	.040	.041

8.2 Regression on background, education and work

Men	HOME	V*	EDUC	SELFD	ADV	%EXP
GENCIV	- 10	12		- 13	12	4
ASSERT	16	12		25		13
Women						
GENCIV	- 13		09			2
ASSERT	10			12	12	5

8.3 Regression on occupation (education controlled)

Men	T	P	AB	M
GENCIV		19		
Women	C	P	A	MS
ASSERT	-.13		16	

Table 9 Practical skills

9.1 Variance components

	Men	Women
GENPRACT	.130	.168
DOM	.221	.082
MECH	.377	.214

9.2 Regression on background, education and work

Men	S*	EDUC	%EXP	
GENPRACT			0	
DOM		19	4	
MECH	.24	-.18	9	
Women	HOME	V*	S*	%EXP
GENPRACT		-.17	.21	7
DOM			-.35	12
MECH	12			1

9.3 Regression on occupation (education controlled)

Men	T	P	AB	M
DOM		.12		
MECH	16	-.10	-.14	.13
Women	C	P	A	MS
DOM			.12	
MECH			-.09	

Table 10 Vocabulary in personal interviews

10.1 Means and standard deviations for indices

	Men		Women		Diff/
	MEAN	S.D.	MEAN	S.D.	S.D.
WORDS	4590	1843	4077	1522	.30
DIFF WORDS	843	255	752	202	.39
LONG WORDS	78	41	63	31	.41
SEQUENCES	95	27	97	26	-.08

10.2 Regression on verbal and civic competence

	GENLANG		GENCIV		ASSERT
	M	W	M	W	W
WORDS	18	.15	n.c.	n.c.	n.c.
DIFF WORDS	29	.32	n.c.	n.c.	n.c.
LONG WORDS	.40	.40	.27	.15	.42
SEQUENCES	-.17	n.c.	n.c.	n.c.	n.c.

10.3 Regression on background, education and work

Men	V*	EDUC	% EXP
LONG WORDS	(.08)	.48	26
Women			
LONG WORDS	(.07)	.43	21

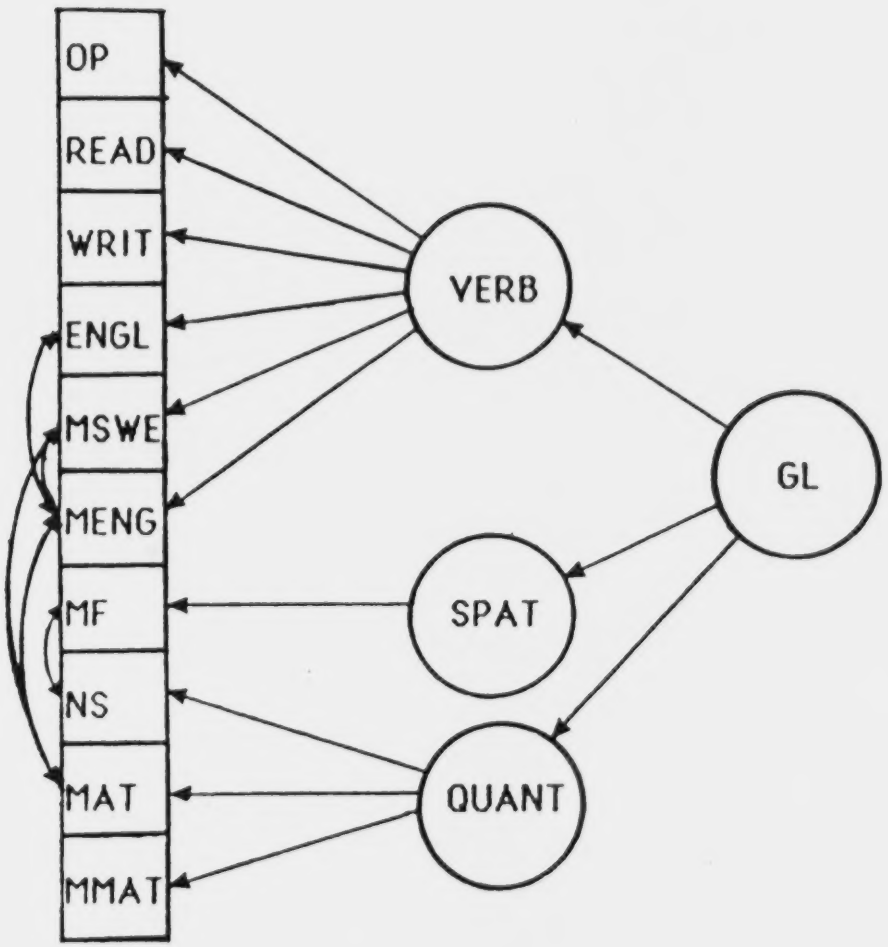

Figure 1 Hierarchical model for ability and achievement

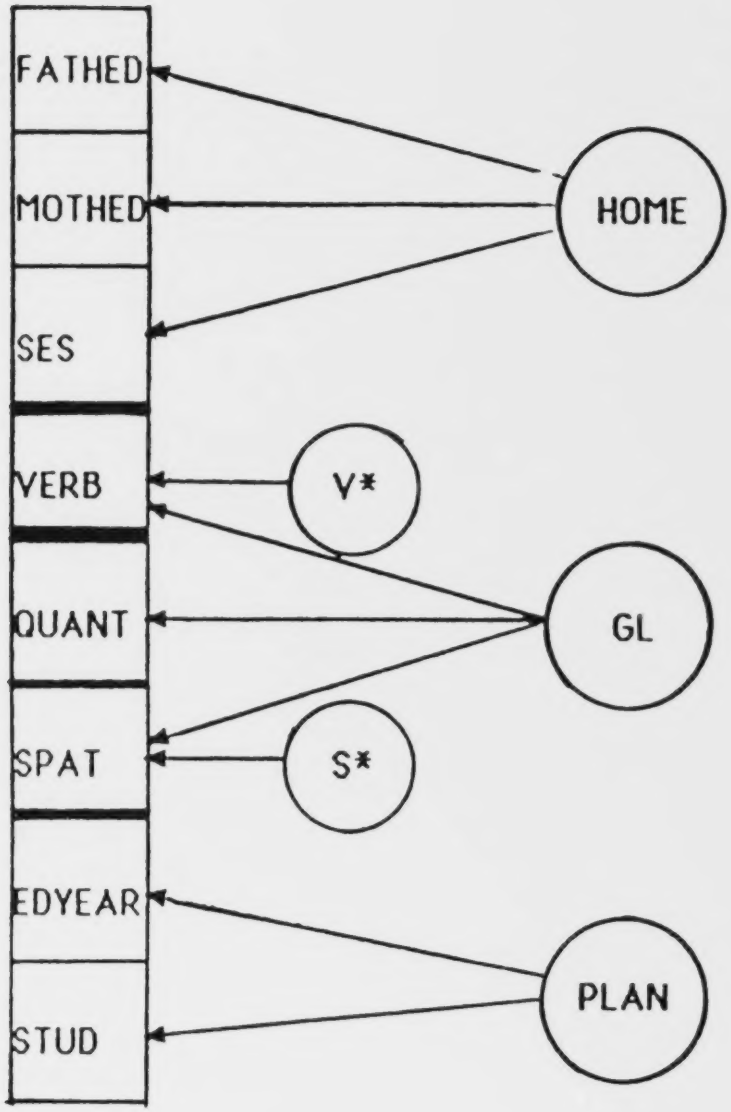

Figure 2 Measurement model for background at age 13

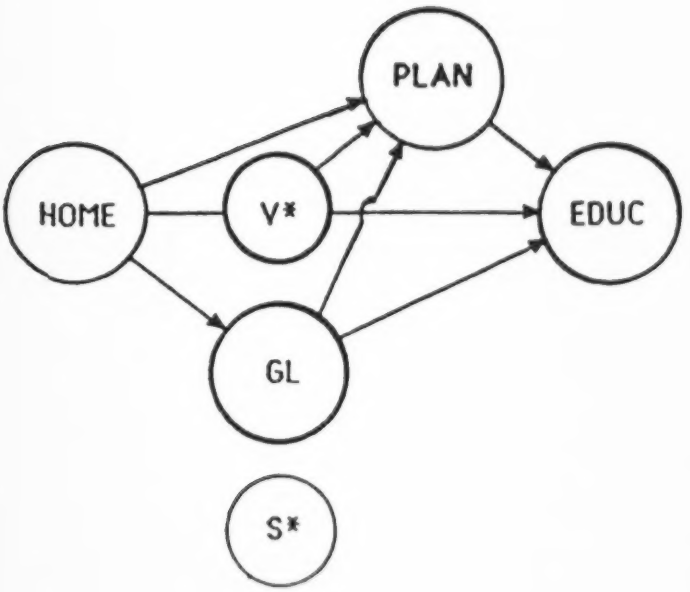

Figure 3 Path model for background at 13 years and education recorded at 32 years

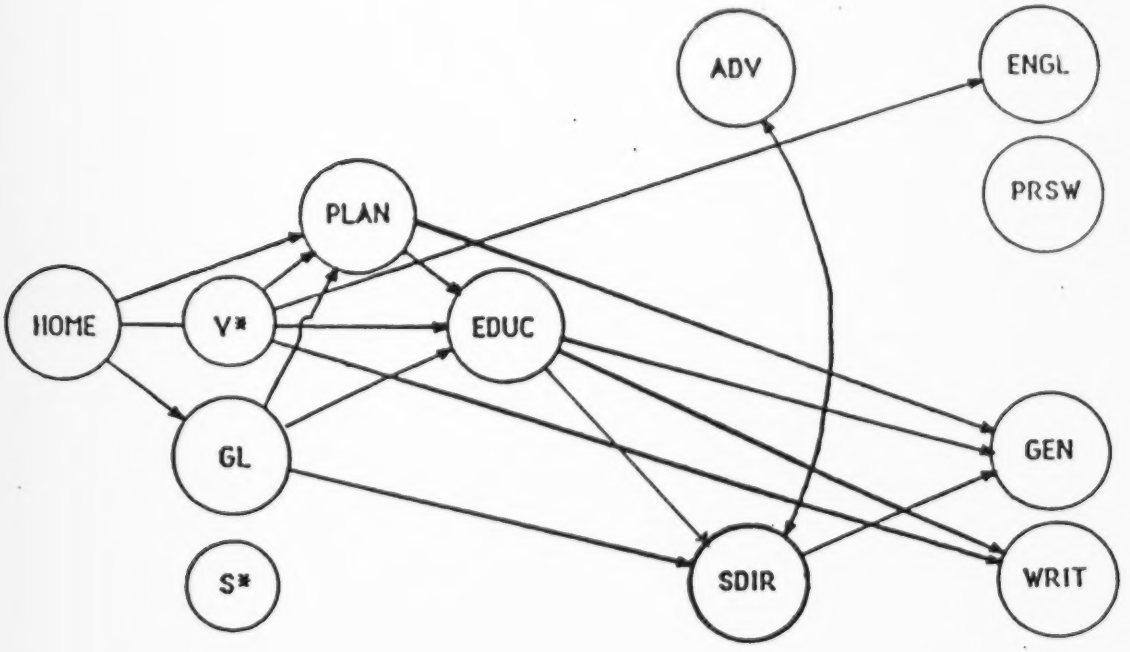

Figure 4a Path model with verbal and language skill as dependent variable
Regressions common for men and women

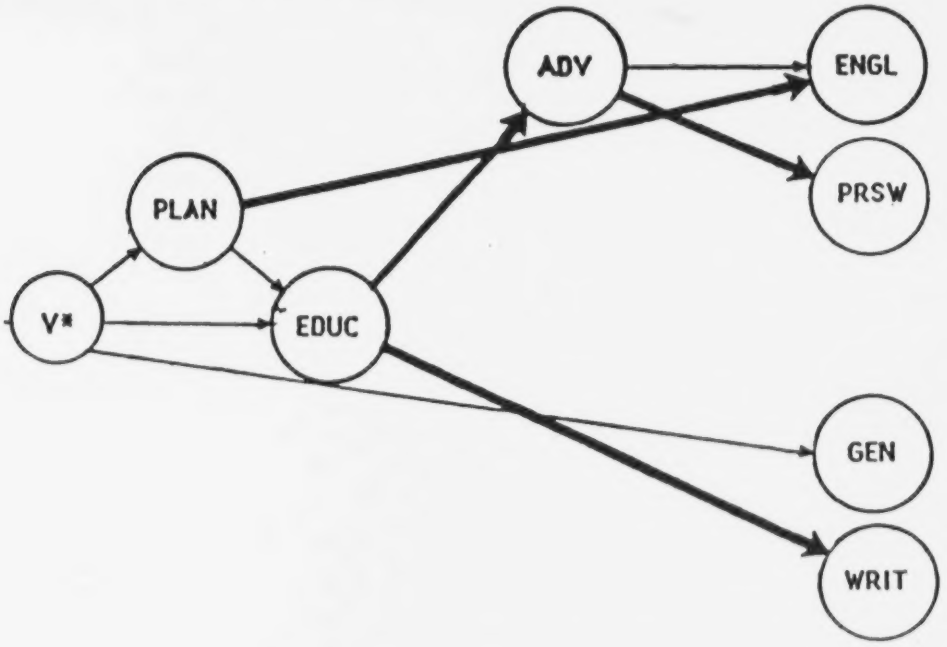

Figure 4b Path model with verbal and language skill
as dependent variable
Regressions specific or stronger for men

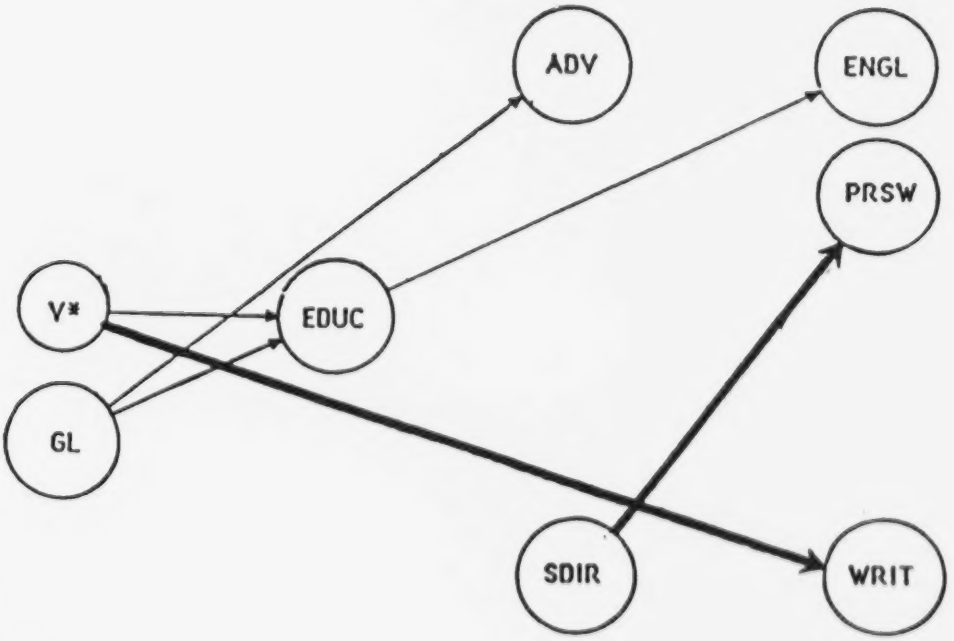

Figure 4c Path model with verbal and language skill
as dependent variable
Regressions specific or stronger for women

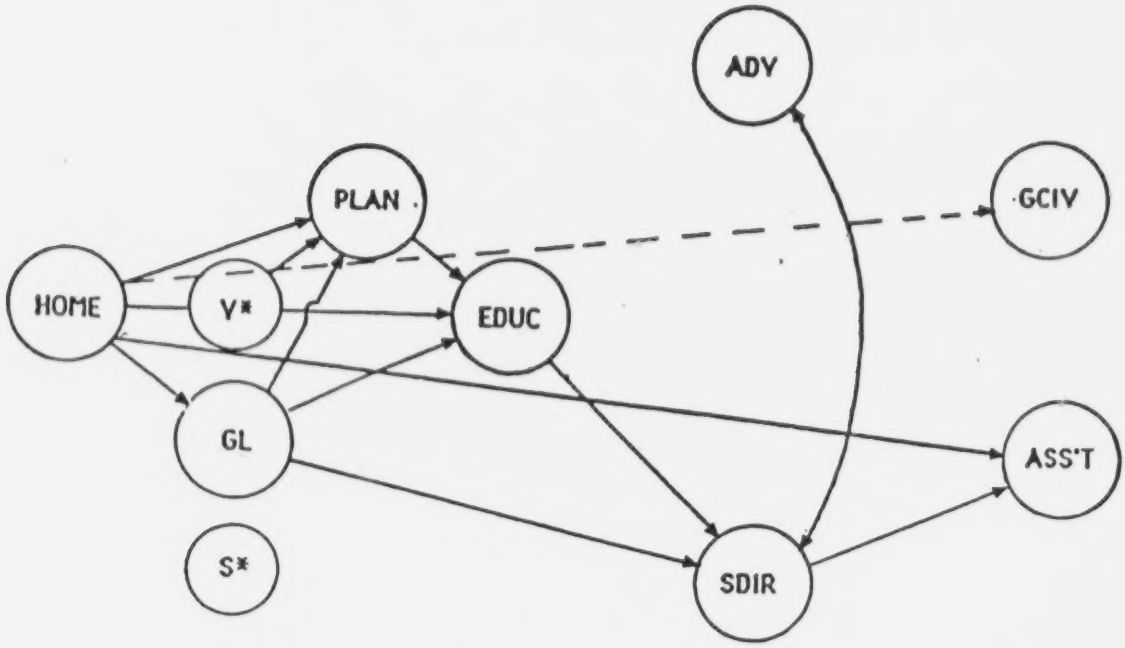

Figure 5a Path model with civic competence as dependent variable
Regressions common for men and women

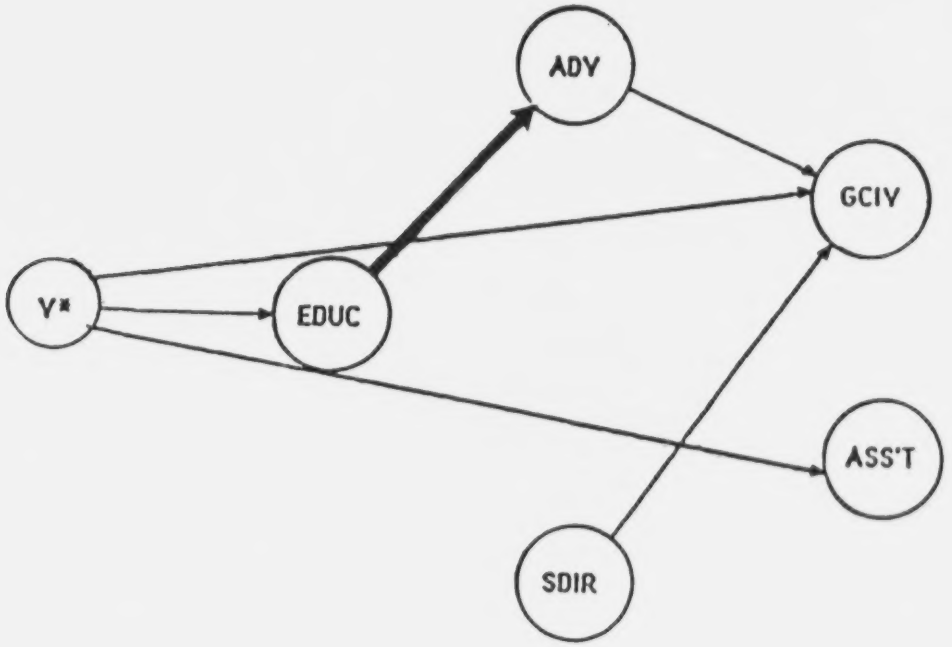

Figure 5b Path model with civic competence as dependent variable
Regressions specific or stronger for men

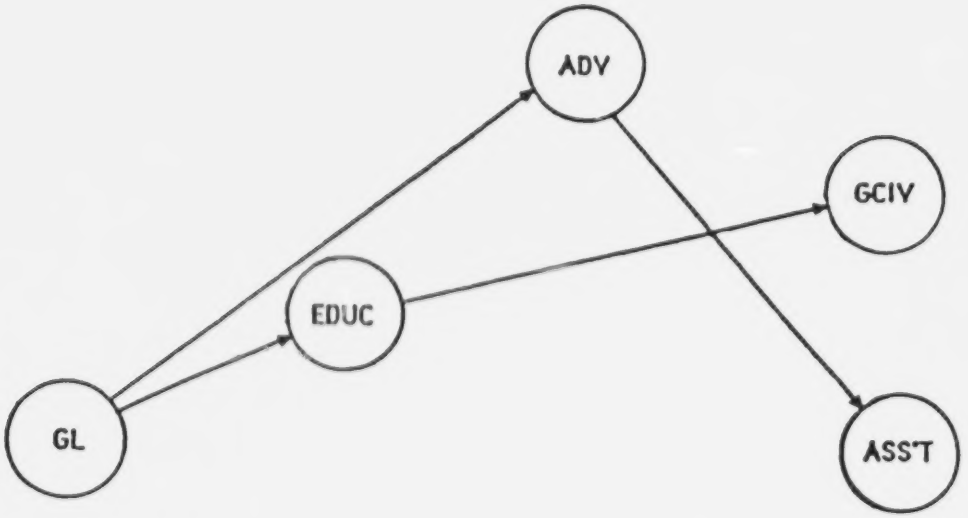

Figure 5c Path model with civic competence as dependent variable
Regressions specific or stronger for women

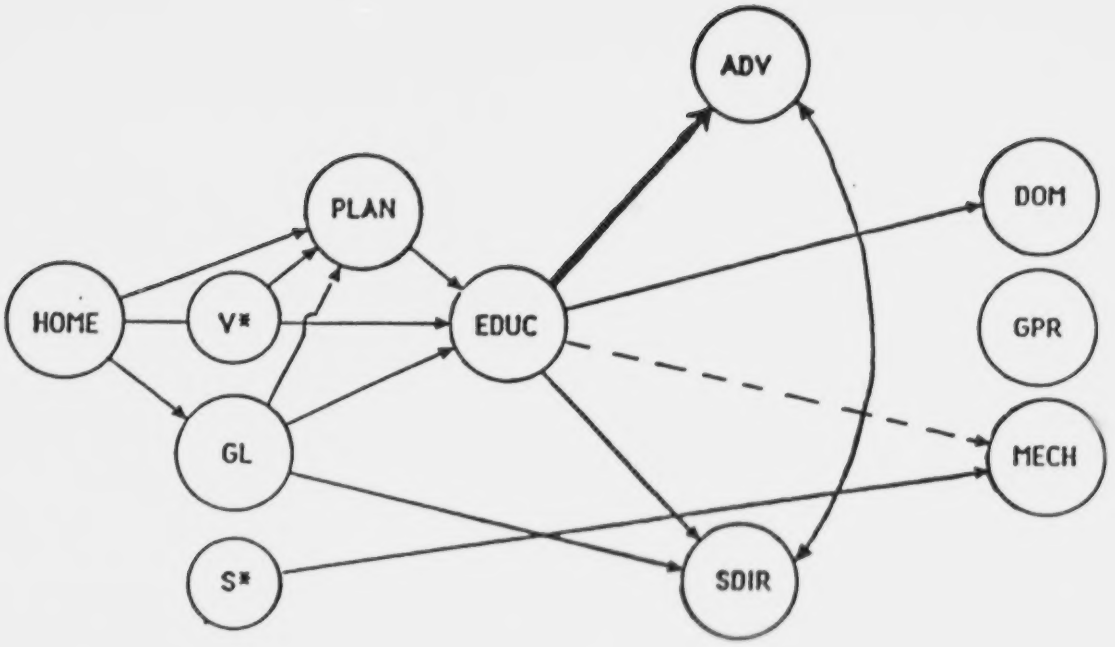

Figure 6a Path model with practical skill as dependent variable
Regressions for men

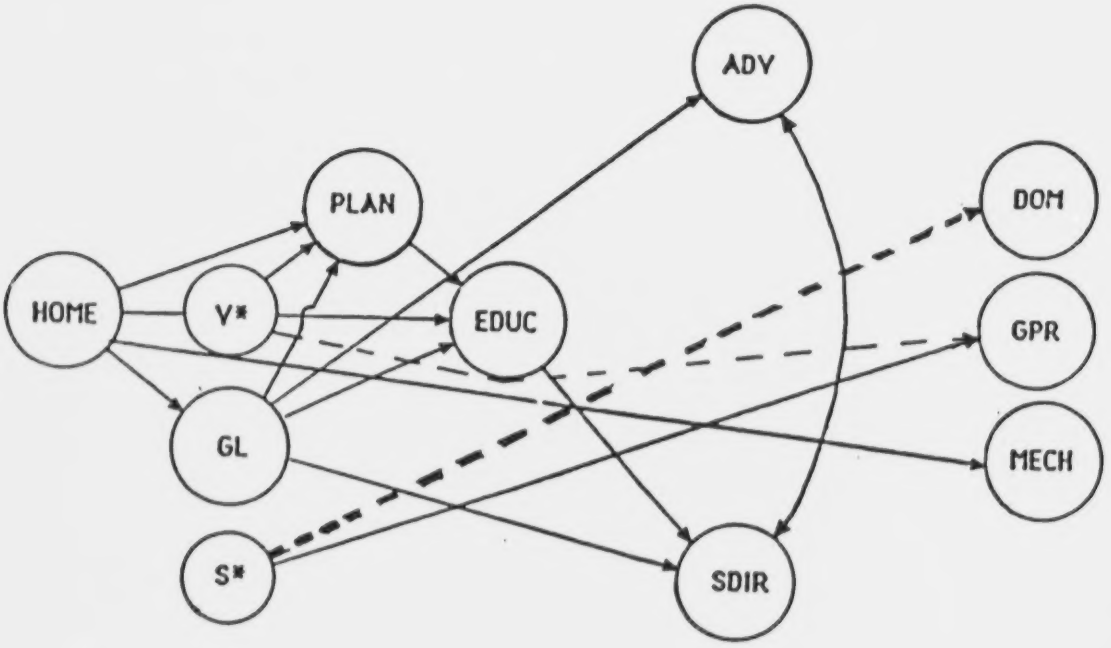

Figure 6b Path model with practical skill as dependent variable
Regressions for women

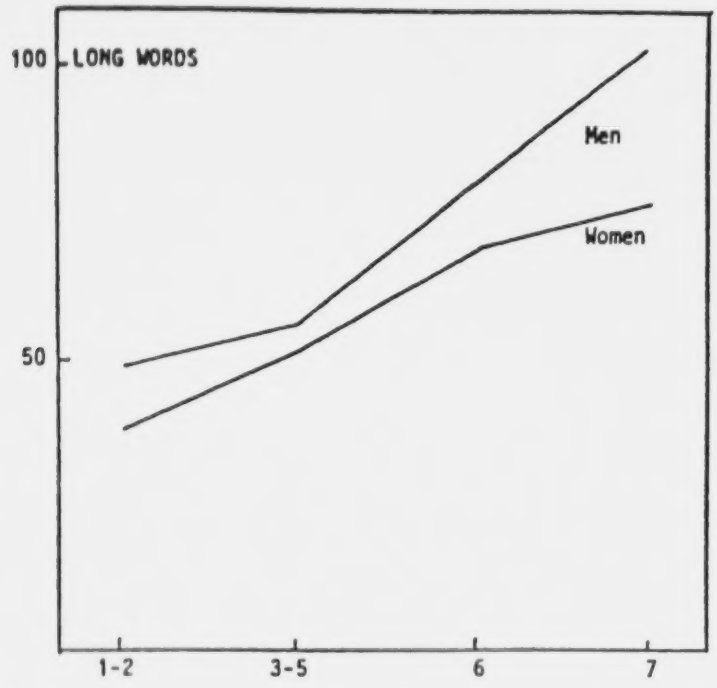

Figure 7a
Long words in relation to Educational level

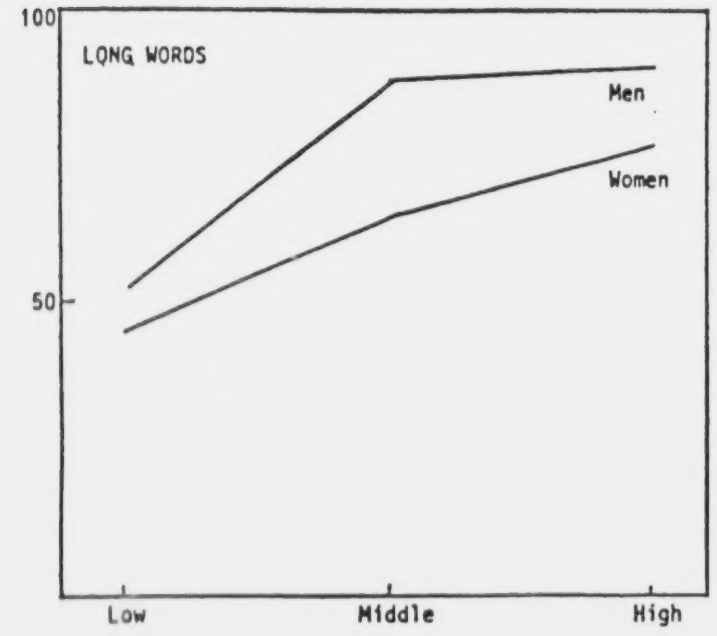

Figure 7b
Long words in relation to Self-rating of general verbal skills